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ABSTRACT

This report provides results of a study that measured lender profitability in the Guaranteed Student Loan (GSL) program and compares these results with the profitability of other types of lending. Data analysis reveals credit card lending to be the highest average level of profitability over the 5-year period considered. Other lending types, in order of profitability, are commercial and industrial loans, student loans, automobile loans, mortgage-backed securities, adjustable-rate mortgages, fixed-rate mortgages, and U.S. Treasury securities. The relative high level of student loan profitability is due to their guaranteed yield, as well as their low level of credit and liquidity risk. The profitability of student lending is also found to have less variability when compared to other types of bank lending. The study is divided into five sections: the first briefly presents the theoretical basis for the measurement of risk-adjusted returns used in the study; section 2 discusses the data used to measure risk-adjusted returns; section 3 presents the estimates of lender profitability for each asset class, as well as future trends; section 4 outlines several limitations to the analysis; and section 5 outlines a methodology for estimating scale economies in the commercial banking sector and applies it to student lending. (GLR)

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LENDER PROFITABILITY IN THE STUDENT LOAN PROGRAM

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Lender Profitability in the Student Loan Program

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April 1991

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Executive Summary

The Guaranteed Student Loan (GSL) program is an important source of funds for many postsecondary students. Loans are made by private lenders with the assurance that the Federal Government will indemnify them from the risk of borrower default. Lenders also receive a guaranteed yield on their student loans equal to the 91-day Treasury bill rate plus 3.25 percent to ensure their participation in the GSL program.

Although full default insurance and a market yield have proven successful in encouraging lender participation in the GSL program, these provisions have also proven quite costly. The interest cost on student loans rises by about $500 million for every one point increase in the Treasury bill rate. Moreover, student loan default costs have risen dramatically, and now top $2 billion per year. To help contain these costs and to encourage effective lender default reduction activities, recent Administrations have proposed a range of measures, including risk sharing and a lowered interest margin. These proposals are based on the assumption that student loans would remain sufficiently profitable so as to ensure continued adequate lender participation in the program, as well as continued adequate loan access for all types of postsecondary students.

Not unexpectedly, student loan lenders have objected vociferously to these proposals, suggesting that many lenders would reduce or eliminate their student lending activities due to reduced profitability. To assess the validity of this claim, the objective of this study is to measure lender profitability in the GSL program. To assess the profitability of student lending it is also necessary to compare it with the profitability of other types of lending. This study therefore also measures the profitability of a number of other lending activities in which most commercial banks participate. These include, fixed and adjustable-rate mortgages, credit cards, automobile loans, commercial and industrial loans (C&I), U.S. Treasury securities, and

mortgage-backed securities (MBS). Together these assets represent more than three-fourths of all commercial banking assets. Although this study measures lender profitability for commercial banks, it is also applicable to thrift institutions.

Lender profitability for each asset class is defined as the difference between the asset's yield and the fee income generated from originating the asset and its matched maturity funding cost, servicing and operating costs, and the risk premium associated with credit and prepayment risk. This is known as the asset's risk-adjusted return. The profitability of each asset was determined for five years between 1985 and 1989.

A wide range of data sources were used to calculate lender profitability for the various asset categories. This was necessary given the lack of data needed to determine exact values for the many variables used to estimate lender profitability. Sources of information include the Federal Reserve Board's Functional Cost Analysis, Bank Rate Monitor, the Consumer Bankers Association, the Student Loan Marketing Association, the Federal Home Loan Mortgage Corporation, the Guaranteed National Mortgage Association, and the Department of Education. The limitations of the data and how they may affect the results are considered in the study. Where possible, the data were checked for consistency against other data sources.

Conclusions:

Based on this analysis, credit card lending had the highest average level of profitability over the five year period considered. It was followed in order of profitability by commercial and industrial loans, student loans, automobile loans, mortgage-backed securities, adjustable-rate mortgages, fixed-rate mortgages, and U.S. Treasury securities. Also of importance to lenders is the variability in profitability for the different asset categories. Lenders prefer stable levels of profitability since it allows for more accurate financial planning, reduces transaction costs,

and alleviates uncertainty. The profitability of credit card lending was found to have the highest variance, followed by C&I lending, and investing in U.S. Treasury securities. Student lending had one of the lowest levels of variability in profit levels.

Given the data limitations, this study may understate the profitability of student lending for several reasons. First, the value of marketing other loan products such as credit cards, mortgages, and other consumer loans to student loan borrowers is not accounted for in the lender profitability estimates. Student loan borrowers are likely to be good future credit risks as well as strong future mortgage and installment credit borrowers. Second, the analysis also does not account for the possibility that student lending may reduce the total level of risk in a lender's portfolio. Since lending institutions face little credit risk when making a student loan, student lending could help insulate an institution from the deleterious effects of an economic downturn when the risk of default for most other lending activities is rising. Given that the estimates of lender profitability in this study were determined for the period 1985-1989, a period characterized by a strongly expanding economy, the full impact of an economic recession on profitability was not accounted for. Finally, the analysis does not fully account for the relatively low level of liquidity and interest rate risk faced by lending institutions when making a student loan. The depth of the secondary market for student loans and the Student Loan Marketing Association's (Sallie Mae) willingness to purchase student loans from lenders all but eliminates liquidity risk, and the adjustable-rate on student loans limits any interest rate risk.

The impact of economies of scale on lender profitability was also not explicitly considered in this study. For certain asset classes, however, lenders do experience significant scale economies. This is especially important in student lending given that a small proportion of all lenders make a substantial portion of all student loans: during FY 1988, for example, the top one hundred lenders, disbursed approximately 65 percent of all loans. It was found that for

every $100 million increase in a lender's portfolio of student loans, the institution's servicing costs fell by three basis points. These scale economies can lead to significant cost savings and higher levels of profitability for the largest student lenders. The impact of scale economies were not included in the lender profitability estimates derived in this study given that the profitability estimates presented are intended to be representative of the entire commercial banking sector and not for any one institution.

This study demonstrates that student lending has been a consistently profitable activity for lenders. Moreover, it is shown that student lending has generally been more profitable than other important lending activities such as mortgage and automobile lending. The relatively high level of student loan profitability is due to their guaranteed yield, as well as their low level of credit and liquidity risk. The profitability of student lending is also found to have less variability when compared to other types of bank lending.

This study is divided into five sections. The first section briefly presents the theoretical basis for the measurement of risk-adjusted returns used in this study. Section two discusses the data used to measure risk-adjusted returns. The third section presents the estimates of lender profitability for each asset class, along with likely future trends in profitability. Section four outlines several limitations to the analysis. The final section outlines a methodology for estimating scale economies in the commercial banking sector and applies it to student lending.

Theoretical Analysis of Lender Profitability

Lenders use a wide range of measures to assess the profitability of their lending activities. These include simple ratios such as return on assets and net interest margin, as well as more sophisticated measures such as net present value. These various measures of profitability are used at different times by financial intermediaries depending on the type of analysis being conducted. One measure of profitability commonly used when comparing the profitability of different financial assets held by commercial banks is their risk-adjusted return.[1]

An asset's risk-adjusted return is determined by deducting from the asset's yield any costs associated with funding and servicing the asset as well as the premium associated with any risks associated with the asset. The risk premium on an asset is equal to the potential costs to the commercial bank of assuming the risks associated with holding the asset. Financial assets held by commercial banks in general face four types of risk, including credit risk, interest rate risk, prepayment risk, and liquidity risk. Credit risk is the potential loss of income to the commercial bank resulting from borrower default, that is, the borrower does not repay the principal and interest on a timely basis. Interest rate risk refers to the potential loss or variability in income due to changes in the level of market interest rates. Interest rate risk occurs when an asset's duration is not equal to the duration of the liability used to fund that asset.[2] Prepayment risk arises from the possibility that a loan will be prepaid by the borrower before its stated maturity. Borrowers oftentimes prepay loans when market interest rates fall

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[1] A more detailed discussion of risk-adjusted returns can be found in Farin, Thomas. "Asset/Liability Managements of Savings Institutions," The Institute of Financial Education, 1989, pgs. 336-338.

[2] Duration is defined as the weighted average time over which the cash flows are expected from a loan, where the weights are the relative present values of the cash flows. For a thorough description of duration as a measure of interest rate risk see Fabozzi and Fabozzi, "Bond Markets, Analysis, and Strategies." Prentice Hall, 1989, pgs. 60-68.

significantly below the interest rate on the loan. The commercial bank is forced to reinvest the funds from the prepaid loan at a lower interest rate. Liquidity risk is the potential loss in income resulting from the inability to sell assets quickly in order to raise cash.

An asset's risk-adjusted return can therefore be represented by the following equation:

$$R = Y + F - CF - SC - CR - IR - PR - LR$$

Where R is the risk-adjusted return on the asset, F is the fee income derived from originating the asset, Y is the asset's yield-to-maturity, CF is the cost of funds associated with funding the asset, SC is the servicing costs, CR is the credit risk premium, IR is the interest rate risk premium, PR is the prepayment risk premium, and LR is the liquidity risk premium.

In this study, interest rate risk is accounted for by the assumption that assets are funded with liabilities of equal duration. In other words, changes in the price of the asset due to changes in market interest rates are fully offset by an opposite change in the price of the liability used to fund the asset. As such, the interest rate risk premium is not explicitly determined. Given the difficulties involved with measuring the liquidity risk premium, it is also not explicitly considered in this study. Although the liquidity risk premium is probably small for most assets, there can be significant differences in liquidity risk across assets. As such, the risk-adjusted return for each asset is measured by:

$$R = Y + F - CF - SC - CR - PR$$

The next section discusses the data used to measure the risk-adjusted return for each asset class over the 1985-1989 period.

Data Sources

The accuracy of the lender profitability estimates derived in this study depends critically on the accuracy of the data. A number of different data sources were used to determine lender profitability for the eight different assets considered in this study. This was necessary given the lack of consistent time series data for each of the different variables needed to calculate risk-adjusted returns. Table 1 lists the variables used in calculating risk-adjusted returns for each of the assets and their source.

A number of different data sources were used to estimate asset yields including the Federal Home Loan Mortgage Corporation (Freddie Mac), the Guaranteed National Mortgage Association (Ginnie Mae), and the Federal Reserve Board. For many of the assets more than one data source was available. The data sources chosen for this study, however, are thought to be the most consistent, comprehensive, and widely accepted.

The cost of funds estimates were based principally on data from Bank Rate Monitor (BRM).[3] Each month, Bank Rate Monitor surveys the five largest banks and five largest savings and loans in a number of different metropolitan areas across the country. Data on certificate of

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[3] It is assumed in this study that commercial banks use a single source marginal cost approach to fund their assets. In the single source marginal cost approach, commercial banks fund each asset with a specific liability. In general, larger lending institutions use the single source marginal cost approach to measure their funding costs. The weighted marginal cost of fund approach, which assumes that assets are financed from a pool of funds available to the lender and oftentimes used by smaller institutions, can be highly subjective for larger institutions since the composition and cost of their incremental funds can be difficult to determine. Moreover, larger institutions are generally "liability driven." A liability driven institution originates loans and then searches for the cheapest source of funding. When a liability driven institution wants to make a loan it generally purchases a specific liability to fund that loan.

It is also assumed that commercial banks fund each asset with a liability that has the same duration. By duration match funding the asset, the lending institution insulates itself from any interest rate risk associated with the loan.

Table 1
Data Sources

Asset	Source
I. Fixed-Rate Mortgage	
Yield	FHLMC
Fee Income	FCA
Cost of Funds	BRM/FCA
Servicing Costs	FCA
Prepayment Costs	RFA
Credit Costs	PMI
II. Adjustable-Rate Mortgage	
Yield	FRB/FHLB
Fee Income	FCA
Cost of Funds	BRM/FCA
Servicing Costs	FCA
Prepayment Costs	RFA
Credit Costs	PMI
III. Credit Card	
Yield	FCA
Fee and Other Income	FCA
Cost of Funds	BRM/FCA
Servicing Costs	FCA
Credit Costs	FCA
IV. U.S. Treasury Security	
Yield	FRB
Cost of Funds	BRM/FCA
Servicing Costs	FCA
V. Mortgage-Backed Security	
Yield	GNMA
Cost of Funds	BRM/FCA
Servicing Costs	FCA
VI. Commercial & Industrial Loan	
Yield	FRB
Fee Income	FCA
Cost of Funds	BRM/FCA
Servicing Costs	FCA
Credit Costs	FCA
VII. Auto Loan	
Yield	BRM
Fee Income	FCA
Cost of Funds	BRM/FCA
Servicing Costs	FCA
Credit Costs	FCA
VIII. Student Loan	
Yield	FRB/ED
Cost of Funds	BRM/FCA
Servicing Costs	CBA
Prepayment Costs	RFA
Credit Costs	CBA

Sources:
BRM: Bank Rate Monitor
CBA: Consumer Banking Association
ED: Department of Education
FCA: Functional Cost Analysis, FRB
FHLB: Federal Home Loan Bank
FHLMC: Federal Home Loan Mortgage Corporation
FRB: Federal Reserve Board
GNMA: Government National Mortgage Association
PMI: Private Mortgage Insurance, Sears
RFA: Regional Financial Associates, Inc.

deposit (CD) rates for CDs of different maturities are available from BRM. BRM data was used instead of data available from the Federal Reserve Board given that the BRM data are for small-time CDs as opposed to large-time CDs traded in the secondary market.[4] The BRM data is more appropriate given that small-time CDs comprise a significantly larger share of commercial bank liabilities than do large-time CDs. In 1990, small-time CDs accounted for 28 percent of all commercial bank liabilities, while large-time CDs accounted for a little more than 18 percent. Moreover, commercial banks have been reducing their use of relatively high cost large-time CDs as a source of funding since 1989.

To derive a total cost of funds, non-interest costs associated with issuing small-time CDs available from the Federal Reserve Board's Functional Cost Analysis (FCA) were added to the BRM estimates of interest costs. These non-interest costs include the cost of overhead, advertising outlays, and the cost of employee time to handle checks, servicing customer complaints, posting account information, and bidding for public funds. In 1989 the FCA estimated, for example, these non-interest costs at 17 basis points.

The Federal Reserve Board's FCA was also used extensively in determining servicing costs and fee income for nearly all the assets considered in this study. The Functional Cost Analysis (FCA) program is a cooperative venture between the Federal Reserve Board and participating commercial banks. The FCA includes information on income, expenses, and net earnings for a number of specific operating functions. The FCA data are reported for three groups of commercial banks: those with deposits of less than $50 million, deposits of between $50-$100 million, and deposits of over $200 million. The income and expense data for commercial banks with over $200 million in deposits were used in this study, given that the average bank

[4] Small-time CDs have denominations of less than $100,000, while large time CDs have denominations of $100,000 or more. Large-time CDs traded in the secondary market are also known as brokered deposits.

has deposits of just over $200 million. The FCA program is conducted annually, and data are currently available through 1989.

Servicing costs for student loans were based on information provided in the Consumer Bankers Association's 1989 Student Loan Survey. These estimates are based on the response of twenty institutions to the CBA's questions concerning the servicing costs involved with student lending.[5] The CBA measure of servicing costs includes direct marketing and origination costs, payment processing, accounting, systems, and operations costs, and the costs of collection, reconciling with guarantors, and handling deferment. Corporate overhead costs were not included in the CBA's estimates. The CBA data was used in lieu of the FCA data given that the FCA does not explicitly consider student loans.

The data on prepayment costs for fixed and adjustable-rate mortgages, mortgage-backed securities, and student loans were calculated by Regional Financial Associates (RFA). The prepayment costs for mortgage loans and MBS were determined based on a proprietary option-based mortgage pricing model.[6] Prepayment costs for student loans were based on information provided by the Consumer Bankers Association for a portfolio of four-year college loans, two-year college loans, and proprietary school loans.[7] Prepayment costs for the other

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[5] Given the relatively small sample of banks in the CBA survey that provided servicing cost information, the data is somewhat less reliable than the FCA data used for the other asset classes.

[6] The prepayment cost for fixed and adjustable rate mortgage loans was assumed to be the same for this analysis. This was done given the lack of data needed to determine prepayment costs for adjustable rate mortages. It is likely that prepayment costs for adjustable rate mortgages is higher than for fixed-rate mortgages.

[7] The information used from the CBA to measure prepayment risk for student loans was for one large student lender. As such, it may not be representative of the universe of student lenders. This data was used in lieu of any other reliable data source.

assets considered in this study were not calculated either due to a lack of applicability or a lack of data.

The data measuring credit risk also come from various sources. Credit costs for fixed and adjustable-rate mortgages are assumed to be equal to the cost of acquiring private mortgage insurance. These data were made available by PMI, a subsidiary of Sears. FCA data were used to estimate credit risk for credit cards, C&I loans, and automobile loans. The credit risk cost on student loans is assumed to be equal to the loan loss reserves generally set aside by commercial bank management given that lenders may incur a penalty if they have not properly followed the due diligence requirements for making, disbursing, servicing, and collecting on student loans. An estimate of the loan loss reserves is provided by the Consumer Bankers Association. U.S. Treasury securities and MBS are assumed to have no credit risk.

The data used from these different sources form the basis for the estimates of risk-adjusted returns by asset class presented in the section that follows.

Lender Profitability by Asset Category

Risk-adjusted returns for the eight asset categories considered in this study over a five year period between 1985 to 1989 are shown in Table 2. The assets are listed in order of their average risk-adjusted returns over the period. The standard deviation of their risk-adjusted returns, a measure of the variability of profitability, is also shown in Table 2.

Table 2
Risk-Adjusted Returns

	1985	1986	1987	1988	1989	Average	Standard Deviation
Credit Card	3.41	4.07	4.46	2.67	1.89	3.30	1.04
C&I Loan	1.14	0.73	1.21	1.66	1.76	1.30	0.42
Student Loan	1.40	0.89	0.79	0.93	1.12	1.04	0.24
Automobile Loan	0.74	1.42	0.60	0.55	1.30	0.92	0.41
Mortgage-Backed Security	1.20	0.43	0.67	0.95	0.63	0.77	0.31
Adjustable-Rate Mortgage	0.67	0.34	0.64	0.74	0.77	0.63	0.17
Fixed-Rate Mortgage	0.40	0.62	0.34	-0.01	0.07	0.28	0.26
U.S. Treasury Security	0.43	-0.58	0.12	0.22	-0.17	0.00	0.39

As shown, there are significant differences between the risk-adjusted returns of the various assets. Credit cards have been consistently the most profitable asset throughout the late 1980s, with average risk-adjusted returns of over 300 basis points, while investments in U.S. Treasury securities have been only marginally profitable. Student loans have also been consistently profitable throughout the period, with an average risk-adjusted return greater than all other assets considered except credit cards and C&I loans. As illustrated, student lending has experienced levels of profitability greater than most traditional bank lending activities for commercial banks such as mortgage and automobile lending.

The risk-adjusted returns for student loans have also exhibited a relatively low level of variability throughout the late 1980s. With a standard deviation of 24 basis points, only adjustable-rate mortgages have experienced a more stable level of profitability.[8] The risk-adjusted returns for credit cards have been highly variable, ranging from nearly 450 basis points in 1987 to less than 200 basis points last year.[9] Low variability in risk-adjusted returns is desirable from the lender's perspective, particularly during recessionary periods when rising credit risk can result in significantly lower risk-adjusted returns for many commercial bank assets.

The determination of risk-adjusted returns for each of the asset categories are considered in the discussion that follows:

Credit Cards

The derivation of the risk-adjusted returns for credit cards between 1985 and 1989 is shown in Table 3. The yield on credit cards includes the finance charges on revolving balances as well as the merchant discount and any fees associated with credit cards and cash advances. Data from the FCA were used to derive these yield estimates given the lack of any other data source for the merchant discount and fees.[10] The duration matched funding cost is equal to the

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[8] The low variability in the risk-adjusted returns for student loans is in part due to the servicing cost estimates used from the CBA. The 1989 estimate of 123 basis points was used for each of the years 1985-1989 given the lack of an available time series.

[9] The variability of the risk-adjusted returns for credit cards is largely due to the variability in servicing costs as reported by the FCA. This variability may result from the relatively small sample of banks included in the FCA, thus overstating the variability in the risk-adjusted returns of credit cards.

[10] It should be noted that these yield estimates are not yield to maturities. These estimates are derived by dividing the income generated by the credit card porfolios of the banks included in

interest and non-interest costs of issuing a three-month CD. Estimates of servicing costs and the credit risk premium is based on information from the FCA.

Table 3
Credit Card

	1985	1986	1987	1988	1989
Yield	24.00	23.05	23.34	21.94	22.69
Cost of Funds	7.90	6.63	6.50	7.15	8.42
Servicing Costs	10.85	9.94	10.81	9.66	10.27
Credit Costs	1.84	2.41	1.57	2.46	2.11
Risk-Adjusted Return	3.41	4.07	4.46	2.67	1.89

The exceptionally high risk-adjusted returns on credit cards is principally due to the very high rates of interest paid by borrowers on outstanding balances as well as the relatively high fees associated with most credit cards. The risk-adjusted returns on credit cards has also been supported by the rapid growth in credit card usage. Over the 1985-1989 period, for example, credit card debt outstanding grew at an average annual rate of 13.4 percent, compared to average annual growth of 7.2 percent for personal loans, and 6.6 percent for C&I loans. Moreover, the interest rates charged on credit card debt is insensitive to changes in market interest rates. During periods of declining market interest rates, for example, the spread between the interest rate paid by credit card borrowers and the commercial bank's cost of funds widens significantly.

Risk adjusted returns on credit cards will come under increasing pressure in the future, however. Increasing competition from nonbank credit cards such as Sears's Discover card and

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the FCA and the total amount of credit card loans outstanding at the institutions. This should not significantly affect comparisons with the risk-adjusted returns of the other assets, however.

AT&T's Universal card have already induced an increasing number of banks to cut annual fees and to lower interest rates. Consumer awareness of the interest rates being paid on credit card debt is also increasing. Consumer advocacy groups are providing information to consumers on how to find low interest rate lenders. Future credit card returns may also be depressed as the market for credit cards becomes increasingly saturated. Finally, the creditworthiness of credit card borrowers has deteriorated as lenders have sought to expand the usage of credit cards. As such, the credit risk premium on credit cards will likely rise in the future.[11]

Commercial and Industrial Loans

The derivation of the risk-adjusted returns for C&I loans between 1985 and 1989 is shown in Table 4. The yield on C&I loans is equal to an interest rate spread over the prime lending rate. The estimated spread is based on a quarterly FRB survey of C&I lending terms of commercial banks. The risk-adjusted returns calculated in this study are for prime-based, short-term floating-rate C&I loans. These loans account for over 35 percent of all C&I loans at commercial banks. The duration matched funding cost is equal to the interest and non-interest costs of issuing a three-month CD. FCA estimates of the costs of servicing C&I loans and their credit risk premium are used in the calculation of risk-adjusted return.

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[11] Indicative of rising credit quality problems in the credit card portfolios of commercial banks during the current recessionary period is the rising delinquency rate for credit cards as reported by the American Banker's Association (ABA). According to the ABA, the proportion of credit card accounts that are 30 days or more delinquent rose to 4.0 percent in the third quarter of 1990, its highest level since 1986.

Table 4
Commercial & Industrial Loan

	1985	1986	1987	1988	1989
Yield	11.43	9.83	9.70	10.82	12.37
Cost of Funds	7.90	6.63	6.50	7.15	8.42
Servicing Costs	1.70	1.69	1.43	1.48	1.59
Credit Costs	0.69	0.78	0.56	0.53	0.60
Risk-Adjusted Return	1.14	0.73	1.21	1.66	1.76

As shown in Table 4, C&I lending has remained relatively profitable throughout the late 1980s. Future risk-adjusted returns on C&I loans will likely be depressed, however, for two reasons. First, the largest and most creditworthy commercial borrowers increasingly use the rapidly growing securities markets to raise funds. This is demonstrated by the surge in commercial paper and corporate bond issuance during the 1980s. Over the past five years, non-financial commercial paper outstanding, for example, has risen at an average annual rate of 15.1 percent, compared to C&I loan growth of 6.6 percent over the same period. Second, credit risk in C&I lending has risen substantially during the current recessionary environment. Moreover, even when economic conditions improve, credit risks faced by C&I lenders may remain high as loans made during the late 1980s, when there was a general lowering in credit standards, continue to fail.

Student Loans

The derivation of the risk-adjusted returns for student loans between 1985 and 1989 is shown in Table 5. The yield on student loans is equal to the 91-day Treasury bill rate plus 325 basis points. The current spread over the Treasury bill rate was set in the Higher Education

Amendments of 1986. The duration matched funding cost is equal to the interest and non-interest costs of issuing a three-month CD. Estimates of servicing costs and the provisions for loan losses, used as a measure of the credit risk premium, were provided by the Consumer Bankers Association. Prepayment costs were derived by RFA based on a representative portfolio of student loans also provided by the CBA.

Table 5
Student Loans

	1985	1986	1987	1988	1989
Yield	10.98	9.23	9.02	9.92	11.36
Cost of Funds	7.90	6.63	6.50	7.15	8.42
Servicing Costs	1.23	1.23	1.23	1.23	1.23
Credit Costs	0.00	0.00	0.04	0.04	0.04
Prepayment Costs	0.45	0.48	0.46	0.52	0.55
Risk-Adjusted Return	1.40	0.89	0.79	0.98	1.12

As shown in Table 5, student loans have experienced consistently high risk-adjusted returns throughout the late 1980s. These high returns are largely due to the Federal Government's effective guarantee of an interest rate spread over lender's cost of funds that more than compensates lenders for the costs of servicing the loans and the loan loss provisions set aside by most lenders.

Automobile Loans

The derivation of the risk-adjusted returns for automobile loans between 1985 and 1989 is shown in Table 6. The yield is for four-year new automobile loans at commercial banks and savings and loans. This data are made available by BRM based on a monthly survey. The duration matched funding cost is equal to the interest and non-interest costs of issuing a two

and half year CD. Estimates of servicing costs and the credit risk premium for automobile loans is based on information available from the FCA.[12]

Table 6
Automobile Loan

	1985	1986	1987	1988	1989
Yield	12.83	11.68	10.84	11.18	12.16
Fee Income	0.41	0.42	0.39	0.40	0.28
Cost of Funds	9.25	7.43	7.44	7.99	8.54
Servicing Costs	2.86	2.77	2.71	2.58	2.30
Credit Costs	0.39	0.48	0.48	0.46	0.41
Risk-Adjusted Return	0.74	1.42	0.60	0.55	1.19

As shown in Table 6, automobile lending has been modestly profitable for commercial banks throughout the late 1980s. Like other types of bank lending, however, the risk-adjusted returns from automobile lending have come under pressure due to strong competition from other nonbank lenders. Domestic automakers as well as consumer finance companies have steadily increased their share of the loan market through the aggressive use of interest rate incentives. This has eroded the risk-adjusted returns on automobile loans for most bank lenders. Lenders may also be hurt by rising credit quality problems over the next several years. In an attempt to support lending growth in the late 1980s many lenders extended the maturities on their auto loans and raised loan-to-value ratios.[13] This lowering of credit

[12]The data from the FCA is for all consumer installment loans including automobile loans.

[13]According to the Federal Reserve Board, the loan-to-value ratio on new car loans rose from 85 percent to 94 percent between 1982 and 1988. On used car loans, loan-to-value ratios rose from 90 percent to 98 percent over the same period.

standards during the 1980s may lead to greater delinquencies and defaults on automobile loans during the 1990s.

Mortgage-Backed Securities

The derivation of the risk-adjusted returns for mortgage-backed securities between 1985 and 1989 is shown in Table 7. The yield is for the current coupon GNMA. The duration matched funding cost is equal to the interest and non-interest costs of issuing a five year CD. GNMAs have no credit risk given that they are backed by a guarantee from the Department of Housing and Urban Development. Investors in GNMAs do face prepayment risk, however. If mortgage interest rates fall, mortgage prepayments tend to increase (as borrowers refinance at lower rates) and investors in mortgage securities have to reinvest the proceeds at reduced market interest rates. If interest rates rise, however, prepayments tend to slow, causing the average life of the mortgage security to increase precisely when investors would like to reinvest the underlying principal at the new, higher market interest rates. This characteristic of all MBS including GNMAs results in prepayment risk for the investor.

Table 7
Mortgage-Backed Security

	1985	1986	1987	1988	1989
Yield	11.89	9.30	9.43	10.04	9.91
Cost of Funds	9.91	7.90	7.93	8.32	8.52
Servicing Costs	0.17	0.23	0.17	0.17	0.17
Prepayment Costs	0.61	0.74	0.66	0.60	0.59
Risk-Adjusted Return	1.20	0.43	0.67	0.95	0.63

As shown in Table 7, MBSs have experienced consistently positive risk-adjusted returns throughout the 1980s. MBSs have become increasingly attractive to commercial banks given their lack of credit and liquidity risk, as well as the relatively low amounts of capital needed to support these investments.[14] Many commercial banks have found that securitizing their mortgage portfolios is a relatively profitable way to reduce their capital needs.

Adjustable-Rate Mortgages

The derivation of the risk-adjusted returns for adjustable-rate mortgages (ARMs) between 1985 and 1989 is shown in Table 8. The yield on ARMs is equal to the interest rate on the one-year Treasury note plus a margin of 250 basis points.[15] This is known as the fully indexed rate. Although lenders offer ARMs with a wide range of margins, according to the FHLB, the average margin is approximately 250 basis points. The duration match funding cost is equal to the interest and non-interest costs of issuing a one-year CD. Servicing cost estimates are based on data from the FCA. Since it is assumed in this study that lenders self-insure the mortgages in their portfolio, the credit risk premium is assumed equal to the cost of private mortgage insurance. Similar to MBSs, ARMs face significant prepayment risk. The prepayment risk premium used to determine risk-adjusted returns is derived by RFA based on a proprietary mortgage model.

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[14] GNMAs have zero percent risk weighting and FHLMCs and FNMAs have a 25 percent risk weighting in the risk-based capital standards adopted in early 1989, and which is being phased in through January 1992. In comparison, the risk weighting for C&I loans, for example, is one hundred percent.

[15] Approximately one half of all ARMs outstanding use the one year Treasury note as an index. While there are several other widely used indices, one of the most popular is the COFI index (cost of funds index). The COFI index is based on the cost of funds for savings and loans in the FHLB's 11th district, but is used by savings and loans and commercial banks throughout the country.

Table 8
Adjustable-Rate Mortgage

	1985	1986	1987	1988	1989
Yield	10.93	8.96	9.26	10.15	11.03
Fee Income	0.29	0.58	0.57	0.34	0.29
Cost of Funds	8.54	7.05	7.04	7.68	8.62
Servicing Costs	1.15	1.16	1.24	1.22	1.09
Credit Costs	0.25	0.25	0.25	0.25	0.25
Prepayment Costs	0.61	0.74	0.66	0.60	0.59
Risk-Adjusted Return	0.67	0.34	0.64	0.74	0.77

As shown in Table 8, ARMs were modestly profitable during the late 1980s. From the lender's perspective, ARMs offer certain advantages over fixed-rate mortgages. Most importantly, given that the interest rate on ARMs eventually adjusts with market interest rates, ARMs help insulate lender's mortgage portfolios from interest rate risk. ARMs can pose significant risks to lenders as well, however. During periods of severe competition in the mortgage market, for example, lenders have offered ARMs at steep discounts. These discounted ARM loans will become profitable only after several years, as lender's cost of funds remain higher than the interest rate on the loan.[16] Moreover, many borrowers who chose ARMs over fixed-rate mortgages do so because they would not qualify for a fixed-rate mortgage. As such, the credit risk associated with ARMs is likely greater than for fixed-rate mortgages.

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[16] The impact of initial so-called "teaser rates" on profitability is not considered in this study. As such, the risk-adjusted returns presented in this study probably overstate the profitability of ARMs.

Fixed-Rate Mortgages

The derivation of the risk-adjusted returns for fixed-rate mortgages between 1985 and 1989 is shown in Table 9. The yield on fixed-rate mortgages is based on a weekly survey of mortgage lenders conducted by the FHLMC. The duration matched funding cost is equal to the interest and non-interest cost of issuing a seven-year CD. Servicing costs are based on data from the FCA. As with ARMs, it is assumed that lenders self-insure the fixed-rate mortgages in their portfolio. The credit risk premium is therefore assumed to be equal to the cost of private mortgage insurance. Like ARMs and MBSs, fixed-rate mortgages face significant prepayment risk. The prepayment risk premium used to determined risk-adjusted returns for fixed-rate mortgages is derived by RFA based on a proprietary mortgage model.

Table 9
Fixed-Rate Mortgage

	1985	1986	1987	1988	1989
Yield	12.41	10.17	10.23	10.34	10.32
Fee Income	0.29	0.58	0.57	0.34	0.29
Cost of Funds	10.29	7.98	8.31	8.62	8.61
Servicing Costs	1.15	1.16	1.24	1.22	1.09
Credit Costs	0.25	0.25	0.25	0.25	0.25
Prepayment Costs	0.61	0.74	0.66	0.60	0.59
Risk-Adjusted Return	0.40	0.62	0.34	-0.01	0.07

As shown in Table 9, fixed-rate mortgages have been only marginal profitable investments for commercial banks throughout the late 1980s. The relatively low risk-adjusted returns on fixed-rate mortgages is largely due to the stiff competition in the mortgage market among commercial banks, savings and loans, mortgage banks, mortgage brokers, and consumer finance companies. The rapid growth in the number of mortgage lenders during the 1980s was

largely the result of the expansion of the secondary mortgage market. With ready access to capital markets through the secondary market, nonbank lenders were able to effectively compete with traditional mortgage lenders such as commercial banks and savings and loans. As a result of the increased competition among mortgage lenders, the interest rate spreads between primary mortgage rates and lender's cost of funds have significantly narrowed.[17] Moreover, spreads are likely to remain thin for the foreseeable future.

U.S. Treasury Securities

The derivation of the risk-adjusted returns for U.S. Treasury securities between 1985 and 1989 is shown in Table 10. The yield is for the seven-year Treasury note. The duration matched funding cost is equal to the interest and non-interest cost of issuing a five-year CD. Serving costs are based on estimates from the FCA. U.S. Treasury securities have no credit or prepayment risk.

Table 10
U.S. Treasury Security

	1985	1986	1987	1988	1989
Yield	10.51	7.55	8.22	8.71	8.52
Cost of Funds	9.91	7.90	7.93	8.32	8.52
Servicing Costs	0.17	0.23	0.17	0.17	0.17
Risk-Adjusted Return	0.43	-0.58	0.12	0.22	-0.17

[17] Lower risk-adjusted returns for fixed-rate mortgages is oftentimes cited as an important factor behind the current difficulties faced by the savings and loan industry. The thrift industry was until very recently the dominant player in the residential mortgage market.

As shown in Table 10, U.S. Treasury securities have experienced both positive and negative risk-adjusted returns during the late 1980s. U.S. Treasury securities do have the advantage of having no credit or liquidity risk. During periods of economic weakness when credit and liquidity risks are high, commercial banks will therefore invest relatively heavily in U.S. Treasury securities. For example, U.S. Treasury securities at commercial banks grew by 13.0 percent year-over-year through December of 1990, compared to year-over-year growth of only 5.1 percent for all loans and securities at commercial banks. As illustrated, however, there are periods when U.S. Treasury securities are not a profitable investment for commercial banks. In 1986, and again in 1989, for example, market rates fell more quickly than CD rates, resulting in negative risk-adjusted returns on U.S. Treasury securities.

Limitations to the Analysis

There are a number of limitations to the lender profitability estimates derived in this study. These limitations are related either to the lack of available data or to problems associated with the data used in the study. These limitations, however, do not significantly influence the conclusions reached in this study. The most important limitations are addressed in the discussion that follows.

First, the lender profitability estimates do not account for the value of cross-marketing loan products or deposit accounts to borrowers. Many student loan borrowers, for example, are likely to be good future credit risks as well as strong future mortgage and installment credit borrowers. In a 1989 study of the home equity loan market by the Federal Reserve Board, for example, it was found that the level of education attained by borrowers of home equity lines of credit were significantly greater than the educational attainment of both first mortgage borrowers and homeowners with no mortgage debt.[18] Although the profitability of home equity lines of credit were not considered in this study, home equity loans are generally thought to be highly profitable.[19]

Second, the analysis fails to consider each asset in the context of an institution's entire portfolio of assets. The level of risk in a portfolio of assets can be significantly different then the sum of the risk levels of each loan type in the portfolio.[20] Given the risk characteristics of

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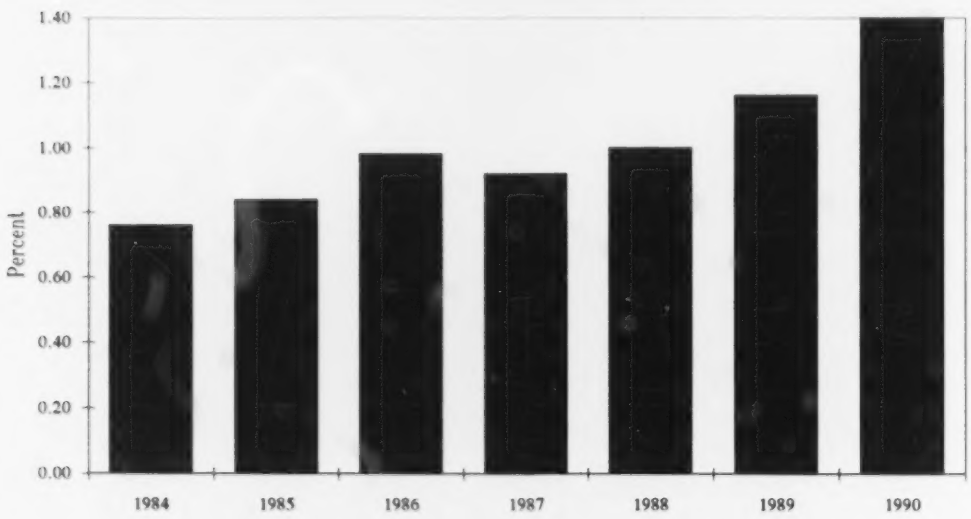
[18] Canner, G., and Luckett, C. "Home Equity Lending." *Federal Reserve Bulletin*, Board of Governors of the Federal Reserve System, May, 1989, 333-344.

[19] The profitability of home equity lines of credit for commercial banks is discussed in the "1989 Home Equity Lines of Credit Report." American Bankers Association, 1989, 17-18, 60-61.

[20] A tenet of portfolio theory is that asset diversification reduces the total risk of the portfolio. Asset diversification reduces portfolio risk only to the extent to which asset returns are not

student loans, for example, student lending may reduce the total level of risk in a lender's portfolio. Since lending institutions face little credit risk when making a student loan, student lending could help insulate an institution from the deleterious effects of an economic downturn when the risk of default for most other lending activities is increasing. Rising credit risk is clearly a problem for financial intermediaries in the current economic environment. This is illustrated in the chart below, which shows net chargeoffs as a percent of total loans for all commercial banks. Net chargeoffs surged to 1.4 percent of total loans in 1990, nearly twice the level of net chargeoffs experienced in 1984. Nonperforming loans and leases plus other real estate owned also rose last year to a record 2.92 percent of total commercial bank assets.

Net Chargeoffs to Total Loans



Third, the analysis does not account for differences in liquidity risk across assets. For many loans, such as C&I loans, the secondary markets are not well developed. For other loans,

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affected similarly by underlying events. If asset returns are perfectly correlated, diversification will not reduce portfolio risk. If asset returns are perfectly negatively correlated, then diversification will completely eliminate portfolio risk.

such as residential mortgages and student loans, the secondary markets are large and function well. As such, liquidity risk for different assets can vary substantially.

Student loans face little liquidity risk due to the depth of the secondary market for student loans and Sallie Mae's willingness to purchase student loans from lenders. Sallie Mae, a federally chartered stockholder-owned corporation, was established in 1972 by an act of Congress to provide a national secondary market for loans made under the GSL programs. Sallie Mae's primary role to foster a secondary market in student loans was expanded significantly in the early 1980s when it was granted additional resources to support the GSL programs.

Sallie Mae provides liquidity for participating lenders by purchasing student loans and making warehouse advances. At the end of 1988, Sallie Mae's outstanding loan purchases totaled $11.3 billion, representing 25 percent of the total GSLs outstanding.[21] The warehousing function allows Sallie Mae to provide lenders with advances which can be used to invest in additional student loans. This service enables lenders to finance their new and outstanding loan portfolios without depleting other funds. In the 1989 Consumer Bankers Association survey of lenders making student loans, 18.6 percent of the lenders reported being funded by Sallie Mae. Other Sallie Mae services include financing commitments, lines of credit, seller servicing, and letters of credit.

In addition to Sallie Mae, there are numerous other secondary markets that purchase student loans. Many states have state or private nonprofit secondary market which, through purchases from originating lenders, provide lenders the liquidity needed to make new loans.

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[21] This information is provided in the "FY 1988 Guaranteed Student Loan Program Data Book." U.S. Department of Education, pg. 21.

Finally, there are limitations to the data used to derive the lender profitability estimates. Most notable are the well-known limitations to the Functional Cost Analysis data. These include: (1) the voluntary nature of the FCA program (subscribing banks might be either high cost institutions interested in identifying areas for cost reduction or low costs institutions that place greater emphasis on cost control); (2) the FCA data are heavily skewed toward small banks; and (3) the procedures used to allocate costs used by the banks and the FRB are sometimes imprecise.[22]

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[22] In a 1978 study, for example, it was found that institutions participating in the FCA program have lower expense ratios. See Heggestad, A., and Minog, J. "On the Usefulness of Functional Cost Accounting Data." *Journal of Bank Research 9*, Winter 1978, 251-56.

Measuring Economies of Scale in Student Lending

A further limitation of the lender profitability estimates derived in this study is that they do not account for the impact of lender size on profitability levels. Lenders realize economies of scale if technology allows production costs to rise proportionately less than output when output increases. Given that a small proportion of all lenders make a substantial portion of all student loans, it is important to consider the impact of economies of scale on lender profitability in the GSL program.

Economies of scale generally occur at lending institutions through the more efficient use of specialized labor, computer and telecommunications technology, and information.[23] In a lending decision, for example, credit information can be reused in other lending decisions. When the cost of reusing information is less than the independent cost of its production, reuse can help reduce the incremental cost of extending additional credit. If the information is reused to make similar loans to the same customer or to other customers in the same region or industry, it will provide a source of economies of scale.

An estimate of the economies of scale in student lending can be derived from the empirical estimation of a statistical cost function. A cost function relates production costs to input prices and the level and composition of output. The cost function estimated in this study uses the translog functional form. This function is widely used in studies of production economies at

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[23] Clark, J. "Economies of Scale and Scope at Depository Institutions: A Review of the Literature." *Economic Review,* Federal Reserve Bank of Kansas City, September/October, 1988, 16-33.

depository institutions because it is flexible enough to yield both economies and diseconomies of scale at different output levels.[24]

Overall economies of scale are typically measured by computing the sum of the output cost elasticities of individual products. The output cost elasticity for a product is the percentage change in production costs that occurs for a given percentage change in the output of the product. The sum of the individual output cost elasticities is equivalent to the percentage change in costs that results from an equal percentage change in the output of all products. When this measure of overall economies of scale is equal to one at a given level of overall output, there are constant returns to scale. Thus, no additional product efficiencies can be achieved in this range of production. If this measure of overall scale economies is significantly less than one, then there are increasing returns to scale and production efficiencies will be realized in this range of production. Conversely, if this measure is significantly greater than one, then there are decreasing returns to scale and production inefficiencies will be realized in this range of production.

While product-specific economies of scale cannot be measured without ambiguities, an approximate measure can be used. This measure makes use of the theoretical relationship between the marginal cost, average cost, and economies of scale. Where the marginal cost of producing a product is less than average cost at a given level of output, average cost is declining in that range of output, implying economies of scale. Conversely, when marginal cost is greater than average cost, average cost is increasing, implying diseconomies of scale. To approximate this relationship in a multiproduct setting, the average incremental cost (AIC) must be considered. The AIC is defined as the addition to total cost of producing a specific

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[24] Although economies of scope, which can arise from the cost savings associated with joint production or two or more banking services, are not explicitly considered in this study, they could also be derived from the estimation results.

level of a product as opposed to not producing it all, divided by the level of output of the product. The AIC can therefore be expressed as a ratio to the marginal cost of producing this level of output. If this ratio is greater than one, this is viewed as evidence of product-specific economies of scale for the range of output levels between zero and the level at which the AIC and marginal cost are evaluated, since it implies that average costs are declining. If the ratio is less than one, product-specific diseconomies of scale are implied.

Based on the estimation results, a number of conclusions can be drawn: (1) overall economies of scale appear to exist for depository institutions; (2) most of these scale economies are realized at lower levels of output (institutions with less than $100 million in deposits); (3) product specific economies of scale exist for mortgage and consumer installment loans, such as student loans; and (4) for every $100 million increase in a lender's portfolio of consumer installment loans, lender's costs fall by approximately three basis points. These results suggest that the largest student lenders are able to enjoy higher levels of profitability than is suggested in this study.

Contributors

The analysis in this report was done by Dr. Mark M. Zandi, Managing Director, Regional Financial Associates, Inc., Paul Getman, Managing Director, Regional Financial Associates, Inc., and Dr. Sarah Jenkins, Assistant Professor of Finance, George Washington University.

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